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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/677,850
Filing Date: October 02, 2003
Appellant(s): RAYNOR ET AL.

MICHAEL W. TAYLOR
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed September 2, 2008 with supplemental brief filed December 29, 2008 appealing from the Office action mailed April 1, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,462,330	VENKAT et al.	10-2002
6,130,448	BAUER et al.	10-2000
5,349,500	CASSON et al.	9-1994

5,949,655	GLENN	9-1999
5,854,482	BIDIVILLE et al.	12-1998
6,300,638	GROGER et al.	10-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

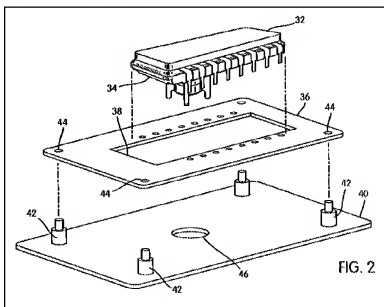
obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 39 – 41, 43, 44, 46, 48 – 54, 57, 58, 60, 61 and 63 – 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkat et al. (U.S. Pat. No.

6,462,330 B1) (hereinafter “Venkat”) in view of Bauer et al. (U.S. Pat. No. 6,130,448 A) (hereinafter “Bauer”) and Casson et al. (U.S. Pat. No. 5,349,500 A) (hereinafter “Casson”).

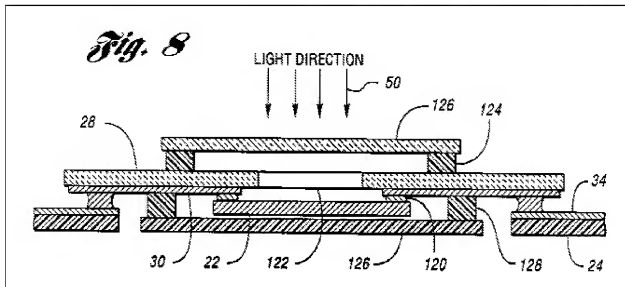
Regarding claims 39 – 41, 46, 48 – 50, 52, 53, 57 and 58, Venkat teaches a method for attaching a sensor (optical sensor IC 32 with an integrated aperture plate 34) comprising a sensing face, a sensor or image sensing area (e.g., lens 56), signal output contacts and a housing (base plate 40) comprising an extended formation (alignment posts 42) to opposite sides of a mounting substrate (printed circuit board (PCB) 36 having additional openings (alignment apertures 44)) having an opening therethrough (38). Venkat teaches that the device components are positioned and aligned during device assembly (see col. 3, lines 1 – 62; figures 2 – 9).



Venkat does not specifically teach the use of bump bonding for facilitating the attachment of the sensor to the mounting substrate.

Bauer does teach the use of bump bonding using solder bump 120 in attaching an optical sensor 22 to a mounting base substrate 28 that comprises circuitry (e.g., conductive strip 30) (see, e.g., col. 10, line 61 – col. 11, line 10; col. 12, lines 41 – 59;

figure 8). As shown in figure 8, the optical sensor 22 is aligned and mounted on the substrate 28 comprising opening 122.



Furthermore, Casson teaches the attachment of a chip device to a flexible printed circuit board using solder bumps to facilitate a secure electrical connection (see, e.g., Abstract). Casson teaches the self-alignment of the chip device to the mounting substrate comprising a flexible printed circuit board using a solder bump bonding methodology that also comprises a heating step (see, e.g., col. 16, lines 52 – 68).

The applicant is advised that the Supreme Court recently clarified that a claim can be proved obvious merely by showing that the combination of known elements was obvious to try. In this regard, the Supreme Court explained that, “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has a good reason to pursue the known options within his or her technical grasp.” An obviousness determination is not the result of a rigid formula disassociated from the consideration of

the facts of the case. Indeed, the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not. "The combination of familiar elements is likely to be obvious when it does no more than yield predictable results." See *KSR Int'l v. Teleflex Inc.*, 127 Sup. Ct. 1727, 1742, 82 USPQ2d 1385, 1397 (2007). In this regard, the use of bump bonding as disclosed by the prior art would have provided a predictable and suitable result in facilitating the attachment of the sensor to the mounting substrate. Furthermore, as indicated by Bauer and Casson, a person of ordinary would accordingly have had a reasonable expectation for success in using bump bonding in facilitating the aligned attachment of the components of the disclosed sensor device. The prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success (see MPEP § 2143.02). Therefore, it would have been obvious to a person of ordinary skill in the art to use bump bonding with the disclosed methodology as claimed to facilitate effective and secure alignment and attachment of the components of the device.

The recited landing feature adjacent an opening is interpreted as being merely the surface area around the opening to which the bump bond is bonded to facilitate the alignment and attachment of the mounting substrate and housing of the disclosed device.

Regarding claims 43 and 60, it would have been obvious to a person of ordinary skill in the art to incorporate a plurality of duplicate bump bonds around the perimeter of the opening in order to provide for a secure alignment and attachment of the optical sensor and mounting substrate. The mere duplication of parts, without any new or

unexpected results, is within the ambit of one of ordinary skill in the art (see MPEP § 2144.04).

Regarding claims 44 and 61, Bauer teaches that the optical sensor 22 is aligned to base substrate 28, 140 and all solder joints are made simultaneously by reflowing solder bump 120 (see col. 12, lines 40 – 51). Casson also teaches the self-alignment of the chip device to the mounting substrate comprising a flexible printed circuit board using a solder bump bonding methodology that also comprises a heating step (see, e.g., col. 16, lines 52 – 68). Therefore, it would have been obvious to a person of ordinary skill in the art to heat the bump bonds so that the sensor would become aligned and then subsequently fixed with the mounting substrate.

Regarding claim 51, the incorporation of additional projections (e.g., 42) with the housing 40 and additional corresponding openings (e.g., 44) with the mounting substrate 36 to facilitate the mating of these two structural components to form an assembled sensor device would have been obvious to a person of ordinary skill in the art. The mere duplication of parts, without any new or unexpected results, is within the ambit of one of ordinary skill in the art (see MPEP § 2144.04).

Regarding claim 54, the use of threaded connections are well known in the art. Therefore, it would have been obvious to a person of ordinary skill in the art to employ the use of threaded connections during the assembly of the disclosed device as claimed.

Claims 45 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkat, Bauer and Casson in view of Glenn (U.S. Pat. No. 5,949,655 A) (hereinafter "Glenn").

Regarding claim 45 and 62, Venkat and Bauer do not specifically teach the incorporation of a CCD device. Glenn further teaches a sensor device comprising a charge coupled device (CCD) incorporated with an integrated circuit (see, e.g., col. 1, lines 39 – 55). A charge coupled device is considered functionally equivalent to the optical sensing device that is incorporated with the device disclosed by Venkat (see MPEP § 2144.06). The Courts have held that an express suggestion to substitute one equivalent component or process for another is not necessary to render such a substitution obvious. See *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982). Thus, it would have been obvious to a person of ordinary skill in the art to incorporate a CCD device with the device disclosed by Venkat and Bauer.

Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Venkat, Bauer and Casson in view of Bidville et al. (U.S. Pat. No. 5,854,482 A) (hereinafter "Bidville").

Regarding claim 47, Venkat and Bauer do not specifically teach the use of a photodiode array. Bidville does teach a device using an optical sensing system incorporating the use of a photodiode array (see col. 9, lines 9 – 34). A photodiode array is considered functionally equivalent to the optical sensing device that is incorporated with the device disclosed by Venkat (see MPEP § 2144.06). The Courts have held that an express suggestion to substitute one equivalent component or

process for another is not necessary to render such a substitution obvious. See *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982). Thus, it would have been obvious to a person of ordinary skill in the art to incorporate a photodiode array system with the device as claimed.

Claims 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Venkat, Bauer and Casson in view of Groger et al. (U.S. Pat. No. 6,300,638 B1) (hereinafter "Groger").

Regarding claims 55 and 56, Groger teaches a biological sensing system incorporating the use of an optical sensor (e.g., photodiode/amplifier package 23) with a matter delivery system (e.g., inlet 36, outlet 38 and cavity 34) (see figures 1 and 4). The photodiode optical sensing system is considered functionally equivalent to the optical sensing device that is incorporated with the device disclosed by Venkat (see MPEP § 2144.06). The Courts have held that an express suggestion to substitute one equivalent component or process for another is not necessary to render such a substitution obvious. See *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982). Thus, it would have been obvious to a person of ordinary skill in the art to incorporate the optical detection system with the disclosed device as claimed.

(10) Response to Argument

Appellant's argument with respect to the rejection under 35 USC 112, first paragraph is persuasive and the rejection had been withdrawn.

With respect to the rejection over Venkat in view of Bauer and Casson, on page 7, paragraph 3 of the brief, Appellant argues that:

A [sic] *readily understood by those skilled in the art*, a "flip chip" is one type of mounting used for semiconductor devices (such as integrated circuit chips), *which uses solder bumps instead of wire bonds or pins* [emphasis added]. In other words, a flip chip arrangement does not require any wire bonds or pins, as disclosed by Venkat et al.

This argument fully supports the Examiner's position. That is, Appellant *admits* that one of ordinary skill in the art readily understands that solder bumps are a substitute for wire bonds, being used instead of wire bonds or pins in a flip chip (face down) mounting, which is exactly what the Examiner is arguing.

Further, Appellant admits that the chip of Venkat is mounted face down, as in a flip chip arrangement. It is the examiner's position that one of ordinary skill, knowing that solder bumps are used in place of wires or pins for mounting chips face down, as admitted by Appellant, would have found it obvious to use solder bumps in place of the wires to mount the face-down chip of Venkat.

Appellant argues that Venkat does not teach bump bonding, but one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellant argues that Bauer is silent as to the issue of alignment, but in that the bump bonds provide electrical connection analogous to the pins or wires, it is the examiner's position that it would have been obvious to align the bond and the signal output of the sensor so as to provide that electrical connection.

Appellant argues that Casson does not teach a mounting substrate having an opening therethrough, but Venkat is relied upon for such teaching. Casson is relied upon for an additional teaching of bump bonding and its advantages. As discussed in the rejection, the references to Bauer and Casson are merely being used to teach additional exemplary aspects of the attachment method pertaining to the use of bump bonding to facilitate the attachment and assembly of the disclosed device. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

With respect to the issue of reflowing solder paste, the solder paste is, as admitted by Appellant, on page 10, paragraph 1 of the Brief, located on a corresponding contact pad. It is not flowing all over the board, but rather in limited areas; thus there is no reason this method cannot be combined with Venkat.

Appellant argues that one of ordinary skill would infer that that the wire bonds of Venkat and their corresponding apertures would not be necessary for ensuring accurate alignment of the IC with the PCB. This argument is not persuasive in the least. The pins align with the holes; that is how the chip inherently and deliberately is aligned with the PCB. There is not some big random trough in the substrate in which pins wobble around, unaligned with the PCB.

Appellant argues that the conductive strip of Bauer is relatively wide, so Bauer is silent as to alignment, but in that the bump bonds provide electrical connection

analogous to the pins or wires, it is the examiner's position that it would have been obvious to align the bond and the signal output of the sensor so as to provide that electrical connection. Further, the recited landing feature adjacent an opening is interpreted as being merely the surface area around the opening to which the bump bond is bonded to facilitate the alignment and attachment of the mounting substrate and housing of the disclosed device.

With respect to the issue of reflowing solder paste, the solder paste is, as admitted by Appellant, on page 10, paragraph 1 of the Brief, located on a corresponding contact pad. It is not flowing all over the board, but rather in limited areas; thus there is no reason this method cannot be combined with Venkat.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). As shown in figure 2 of Venkat, it would have been obvious to a person of ordinary skill in the art that the device components comprising the sensor and the mounting substrate would have to be aligned properly during attachment in order for the device to be assembled in the proper manner. Therefore, the cited prior art references teach the "flip-chip arrangement" as recited in the claims.

Appellant argues that the at least one landing and at least one bump are provided at specific locations, but no specific locations are recited in the claims. Further, Venkat teaches specific alignment of the pins (analogous to the bumps) and apertures (analogous to the landings). Bauer teaches alignment of the bumps and binding (landing) regions on the conducting strip. Casson teaches specific alignment of the bumps and contact pads (instant landings).

Appellant argues that the instant method draws the image sensor into precise alignment with the aperture or mounting substrate, but no such limitation is found in the claims.

With respect to dependent claims 45, 62, 47, 55 and 56, Appellant argues that the teaching references do not remedy the alleged deficiency of the rejection based upon Venkat, Bauer and Casson, but there is no deficiency in the rejection as explained above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Jan M. Ludlow/
Primary Examiner, Art Unit 1797

Conferees:

Art Unit: 1797

/Jill Warden/

Supervisory Patent Examiner, Art Unit 1797

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795